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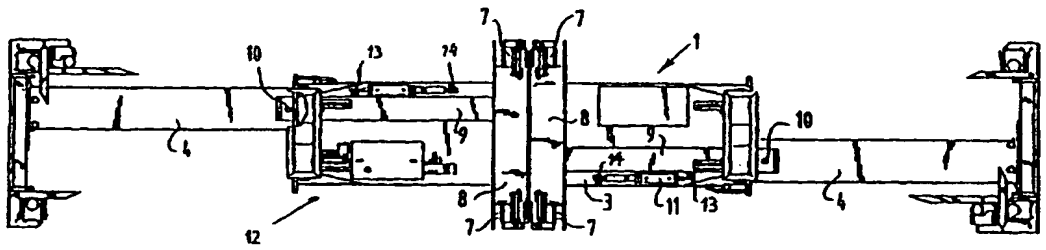

(57) Abstract

The invention relates to a hoisting frame (1), specifically for hoisting containers (2), comprising a longitudinally adjustable beam (12) having a plurality of outer pickup elements (5) arranged at its ends and inner pickup elements (6) arranged near its center, said inner pickup elements being connected to the beam (12) moveable in longitudinal direction. The inner pickup elements (6) are moveable along the beam (12) in pairs, and are for instance each arranged in pairs on a saddle (8) placed transversely on the beam (12) and slideable therealong. The invention also relates to a method for transporting containers (2) by means of such a hoisting frame (1), comprising picking up at least two adjacent containers (2) at a first location, lifting the containers (2) and moving them through the air to a second location, and lowering the containers (2) at the second location, wherein at least one of the containers (2) is moved in longitudinal direction relative to the hoisting frame (1) between lifting and lowering thereof. The hoisting frame of the invention allows containers stacked with various spacings to be transported in double-acting operation.

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Hoisting frame and method for its use

The invention relates to a hoisting frame, specifically for hoisting containers, comprising a longitudinally adjustable beam having a plurality of outer pickup elements arranged at its ends and inner pickup elements arranged near its center.

Such a hoisting frame is generally known, and may be used for hoisting two containers placed with their end faces adjacent one another. A problem which occurs here is that the positioning of the two containers adjacent one another is not always constant, and that therefore the spacing of the containers often varies. Thus in practice it is often not possible to pick up two containers at the same time with a single hoisting frame, so that it is then necessary to shorten the hoisting frame again for subsequently picking up the containers individually. This of course leads to a serious loss of time.

This problem occurs especially when transferring containers between shore and ship. For onshore containers will usually be stacked with a virtually constant spacing of no more than approximately 80 millimeters, whereas the stacking of containers on a ship depends on the specific structure of the ship, and will therefore vary from ship to ship. This is due to the requirement that the containers on a ship should be well stowed. This has for its result that during loading or unloading a container ship it is often impossible to handle two containers at the same time, so that such loading or unloading takes relatively much - literally valuable - time.

The invention therefore aims to provide a hoisting frame with which the above-mentioned drawbacks are obviated. According to the invention, this is accomplished in that at least the inner pickup elements are connected to the beam moveable in longitudinal direction. In this

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way the hoisting frame may be easilly adapted to variations in spacing between containers onshore and onboard a ship.

Since a container must normally be picked up by two inner and two outer pickup elements, the inner pick up elements are preferably moveable along the beam in pairs. A structurally simple and robust embodiment of the hoisting frame is obtained when the inner pickup elements are each arranged in pairs on a saddle placed transversely on the beam and slideable therealong.

Although in principle the containers may form a shape and force defining connection between the inner and outer pickup elements, advantageously the outer pickup elements are connectable to the corresponding inner pickup elements and concurrently moveable therewith. In this way the container is not additionally stressed during movement of the pickup elements. Preferably the beam comprises a central part and at least two arms carrying the outer pickup elements and being moveable in longitudinal direction relative to the central part, each saddle being arranged to be releasably fixed to a corresponding arm. Thus a simple mechanical coupling is formed between the inner and outer pickup elements.

Preferably the hoisting frame comprises controllable means for moving each arm and the saddle connected thereto relative to the central part. These moving means might be formed by means for adjusting the length of the beam for use with one or two containers which are already present in the hoisting frame, but they preferably comprise at least one hydraulic cilinder arranged between the central beam part and the saddle.

The invention also relates to a method for transporting containers using the hoisting frame described above. The known manner of transporting containers comprises picking up at least two adjacent containers at a first location, lifting the containers and moving them through the air to a second location, and lowering the containers

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at the second location, and is characterized according to the present invention, in that at least one of the containers is moved in longitudinal direction relative to the hoisting frame between lifting and lowering thereof. Preferably the spacing of the containers is changed between lifting and lowering thereof. In this way containers which are stacked with a certain spacing at a first location, for instance onshore, may easily be picked up and transported to a second location, for instance onboard a ship, where they may be stacked with a different spacing. It is thus possible to pick up and transport containers which should be stacked with different spacings at different locations at least two at a time, whereby the transport capacity is greatly increased.

Advantageously the movement of the containers is asymmetrical relative to a center point of the hoisting frame. In this way an excentric loading of the hoisting frame and therefore of the crane carrying the hoisting frame, for instance in case one of the two containers is fully loaded and the other one is totally empty, may be prevented. Thus no special requirements are necessary for cranes with which containers may be handled two at a time.

The invention is now illustrated by way of an example, with reference being made to the annexed drawing, in which:

fig. 1 is a top view of a hoisting frame according to the invention in its initial position for picking up two containers arranged at the nominal spacing,

fig. 2 is a side view of the hoisting frame of fig. 1,

fig. 3 is a top view of the hoisting frame of figs. 1 and 2 in an extended state for picking up containers of which the spacing deviates from the nominal value,

fig. 4 is a side view of the hoisting frame in the position as illustrated in fig. 3,

fig. 5 is a cross sectional view of the hoisting frame taken along the line V-V in fig. 2, and

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fig. 6 is a view corresponding to fig. 5 of the hoisting frame in its position of rest, in which the pickup elements are retracted.

A hoisting frame 1, a so-called "twinlift" is adapted for handling various sizes of containers 2. Thus the hoisting frame 1 may handle containers having lengthwise dimensions of 20, 30, 35, 40, 45, 48 and 53 feet during single-acting operation, while two 20 feet containers may be handled at the same time in double-acting or "twinlift" operation. For handling the various sizes of containers the hoisting frame 1 is adjustable in longitudinal direction, and is formed by a central beam part 3 and two arms 4 slideably arranged in the central part 3. At the ends of the arms 4 outer pickup elements 5, so-called "twistlocks" are arranged. Furthermore inner pickup elements 6 are arranged on the central part 3 of the beam, also in the shape of so-called "twistlocks". The inner pickup elements 6 are retractable, since they are only needing during "twinlift" operations. To this end the pickup elements 6 are arranged in cradles 7 that are slideably arranged on the central part 3 of the hoisting frame 1.

In order to be able to pick up pairs of containers 2 placed with various spacing during "twinlift" operations of the hoisting frame 1, the inner pickup elements 6 are arranged in pairs on a saddle 8 placed transversely over the central beam part 3 and slideable therealong. Each saddle 8 may for instance be slideable over a length of 725 millimeters, so that spacings up to 1,45 meter may be bridged. Each saddle 8 further comprises an outrigger 9 through which it may be releasably fixed to the corresponding sliding arm 4. To this end the outrigger 9 in the illustrated example is provided with a locking pin 10 which engages the arm 4. In this manner the nominal distance of 20 feet between the outer pickup elements 5 and the inner pickup elements 6 is fixed. Other ways of locking, for instance by means of a hydraulic lock are of

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course conceivable. It is even envisaged that locking the saddle 8 and the arm 4 relative to one another may be dispensed with, since the container 2 suspended therefrom forms a force and shape defining connection between these two parts.

When the saddle 8 is thus fixed to the arm 4, the assembly of arm and saddle may be moved in longitudinal direction of the hoisting frame 1. This could be performed by means of the drive for telescopically extending or retracting the arms 4, but preferable a separate double acting drive cilinder 11 is used, having one end 13 fixed to the outrigger 9 and its other end 14 to the central beam part 3.

In this way two 20 feet containers 2 may be handled in each position of the arms 4, with the position of the arms 4 being adapted to the mutual position of the containers to be picked up. Movement of the arms 4 is possible both in unloaded and loaded condition, even when the containers 2 carried by the hoisting frame 1 are themselves loaded. By using cilinders 11 for the movement, this may furthermore be performed steplessly. Each cilinder 11 also acts as safeguard against unintentional movement of the arm 4, for instance when this is unexpectedly subject to a horizontal force due to a collision or the like. The containers 2 are thus prevented from breaking loose from the hoisting frame 1.

The movement of the inner and outer pickup elements 5, 6 by moving the arms 4 and the saddles 8 may take place synchronously on both sides of the hoisting frame 1, for instance as a result of a mechanical, hydraulic or electrical coupling of the driving means, but it is also possible that the pickup elements 5, 6 on one side of the hoisting frame 1 are moved independently of the pickup elements on the other side of the hoisting frame 1. In this way one of the containers 2 might for instance be moved, while the other container remains stationary. This leads to the containers 2 being asymmetrically suspended

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form the hoisting frame 1. It is even possible to move both containers 2 in the same direction, whether or not they are coupled to each other. In this way a strongly excentric loading of the hoisting frame 1, for instance when one of the containers is completely loaded and the other container is totally empty, may be prevented. This is important since a strongly excentric loading of the hoisting frame leads to a corresponding excentric loading of a crane carrying the hoisting frame, which for instance in case of a riding crane might result in a number of its wheels being lifted from the ground, and in the most extreme case might lead to toppling of the crane. Due to the possibility of moving the containers relative to the hoisting frame in principle any crane may be used for similtaneously handling two containers.

Instead of the movement of the pickup elements by means of hydraulic cilinders, belt drives and other drive mechanisms and controlled by electronic control systems as described above, it is of cours also conceivable to perform this movement by hand. This may be useful when only sporadically will a container have to be moved in longitudinal direction of the hoisting frame, in which case the additional investment for the controllable moving means will probably not be justified.

For controlling the movements of the various parts of the hoisting frame standard control lines present between a crane and a hoisting frame are advantageously used. In any case there are lines for telescopically lengthening or shortening the hoisting frame, since each hoisting frame offers this possibility, whereas for a conventional double acting hoisting frame there will further be control lines for retracting and extending the pickup elements. By appropriately connecting the control of the additional mechanisms for longitudinally moving and/or locking the pickup elements with those of the moving mechanisms present on a conventional hoisting frame, the standard control lines may suffice, whereby the

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hoisting frame according to the invention may easily be exchanged for conventional hoisting frames.

Since the arms 4 will generally be driven simultaneously by means of for instance a belt drive, two indicators for each cilinder 11 are sufficient for automatically determining six fixed positions, including the fully extended final position. Furthermore each desired position may be determined by means of encoders. It is further possible to switch from single acting to "twinlift" operation through a single remote switch, for instance from the cabin of the crane, and to change the programmed dimensions in the direction of width.

In this way the hoisting frame according to the invention allows the spacing of two containers that are to be picked up or one already picked up thereby to be steplessly adjusted. For controlling this the wiring already present on such a hoisting frame may be used. Furthermore, the nominal distance of the "twistlocks" is always maintained in such hoisting frame, while the picked up containers remain fully locked in each position of the frame.

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Claims

1. A hoisting frame (1), specifically for hoisting containers (2), comprising a longitudinally adjustable beam (12) having a plurality of outer pickup elements (5) arranged at its ends and inner pickup elements (6) arranged near its center, **characterized in that** the inner pickup elements are connected to the beam (12) moveable in longitudinal direction.

2. The hoisting frame (1) according to claim 1, **characterized in that** the inner pickup elements (6) are moveable along the beam (12) in pairs.

3. The hoisting frame (1) according claim 2, **characterized in that** the inner pickup elements (6) are each arranged in pairs on a saddle (8) placed transversely on the beam (12) and slideable therealong.

4. The hoisting frame (1) according to anyone of the preceeding claims, **characterized in that** the outer pickup elements (5) are connectable to the corresponding inner pickup elements (6) and moveable concurrently therewith.

5. The hoisting frame (1) according to claim 3 and 4, **characterized in that** the beam (12) comprises a central part (3) and at least two arms (4) carrying the outer pickup elements (5) and being moveable in longitudinal direction relative to the central part (3), and in that each saddle (8) may be releasably fixed to a corresponding arm (4).

6. The hoisting frame (1) according to claim 5, **characterized by** controllable means for moving each arm (4) and the saddle (8) connected thereto relative to the central part (3).

7. The hoisting frame (1) according to claim 6, **characterized in that** the moving means comprise at least one hydraulic cilinder arranged between the central beam part (3) and the saddle (8).

8. A method for transporting containers (2) com-

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prising at a first location picking up at least two adjacent containers (2) by means of a hoisting frame (1), lifting the containers (2) and moving them through the air to a second location, and lowering the containers (2) at the second location, **characterized in that** at least one of the containers (2) is moved in longitudinal direction relative to the hoisting frame (1) between lifting and lowering thereof.

9. The method according to claim 8, **characterized in that** the spacing of the containers (2) is changed between lifting and lowering thereof.

10. The method according to claim 8 or 9, **characterized in that** the movement of the containers (2) is asymmetrical relative to a center point of the hoisting frame (1).

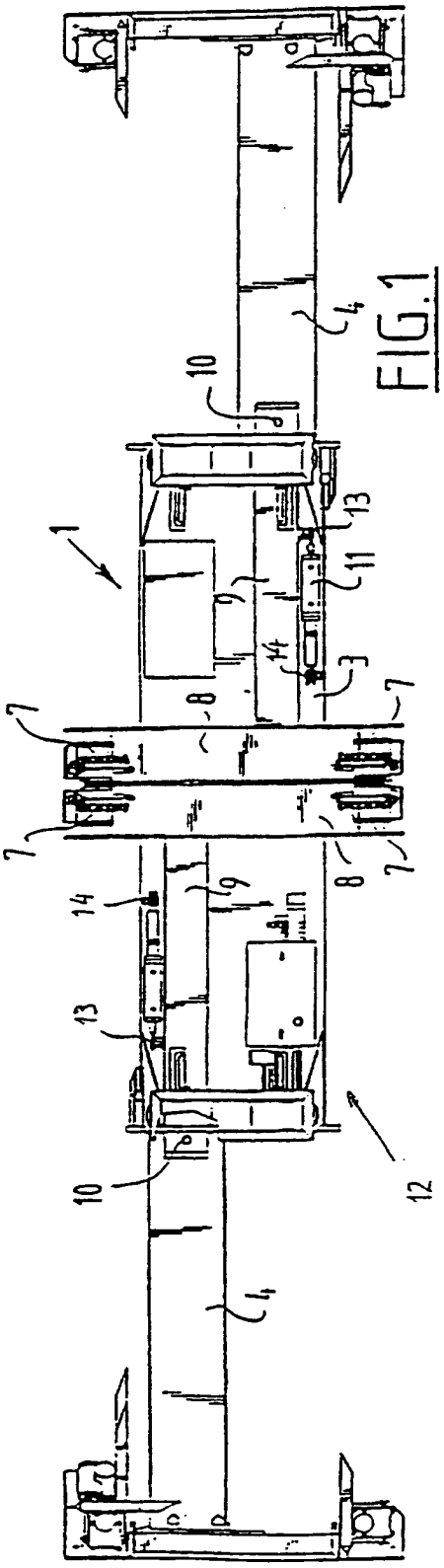

FIG.1

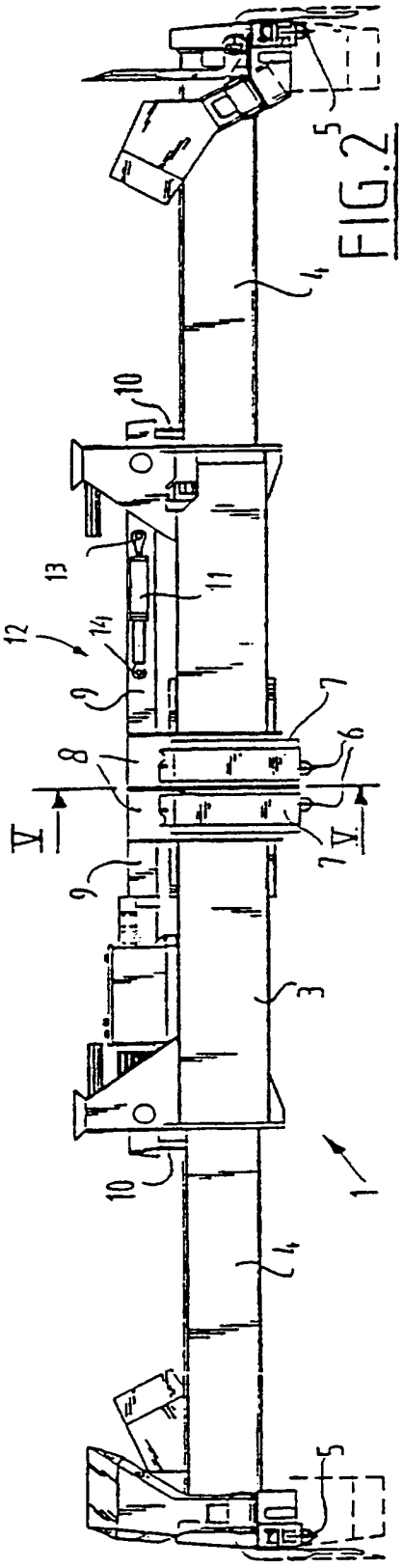

FIG.2

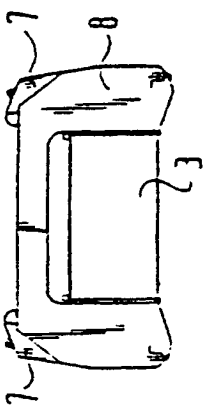

FIG.6

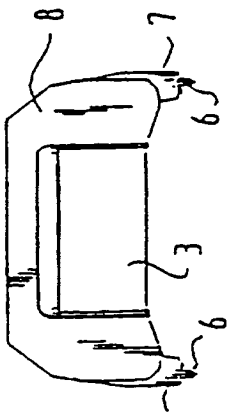

FIG.5

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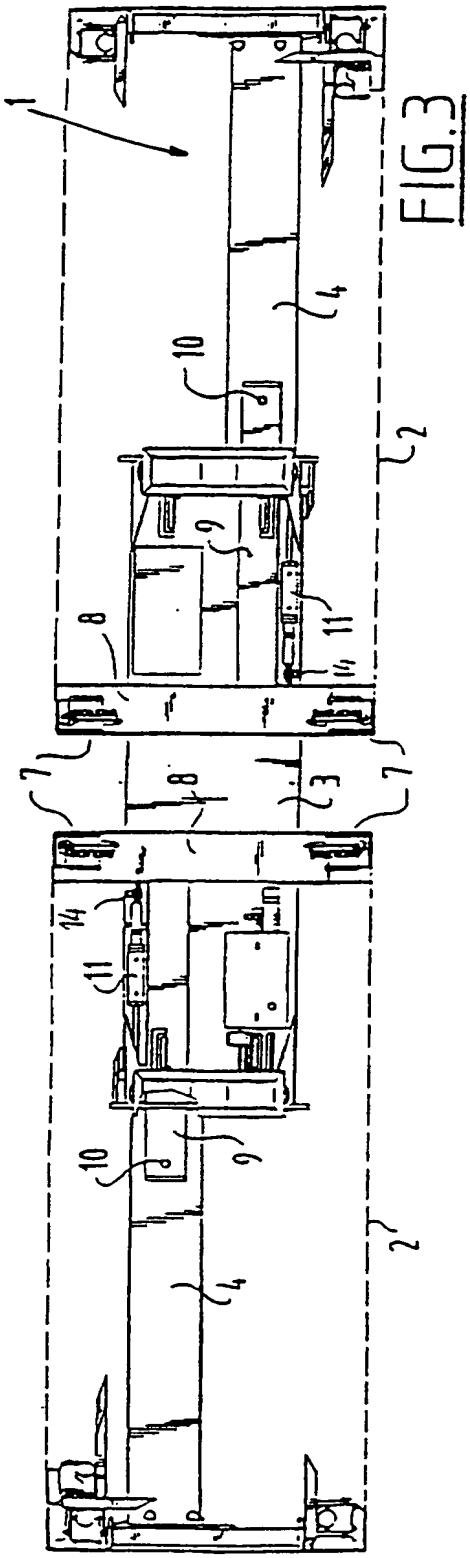

FIG.3

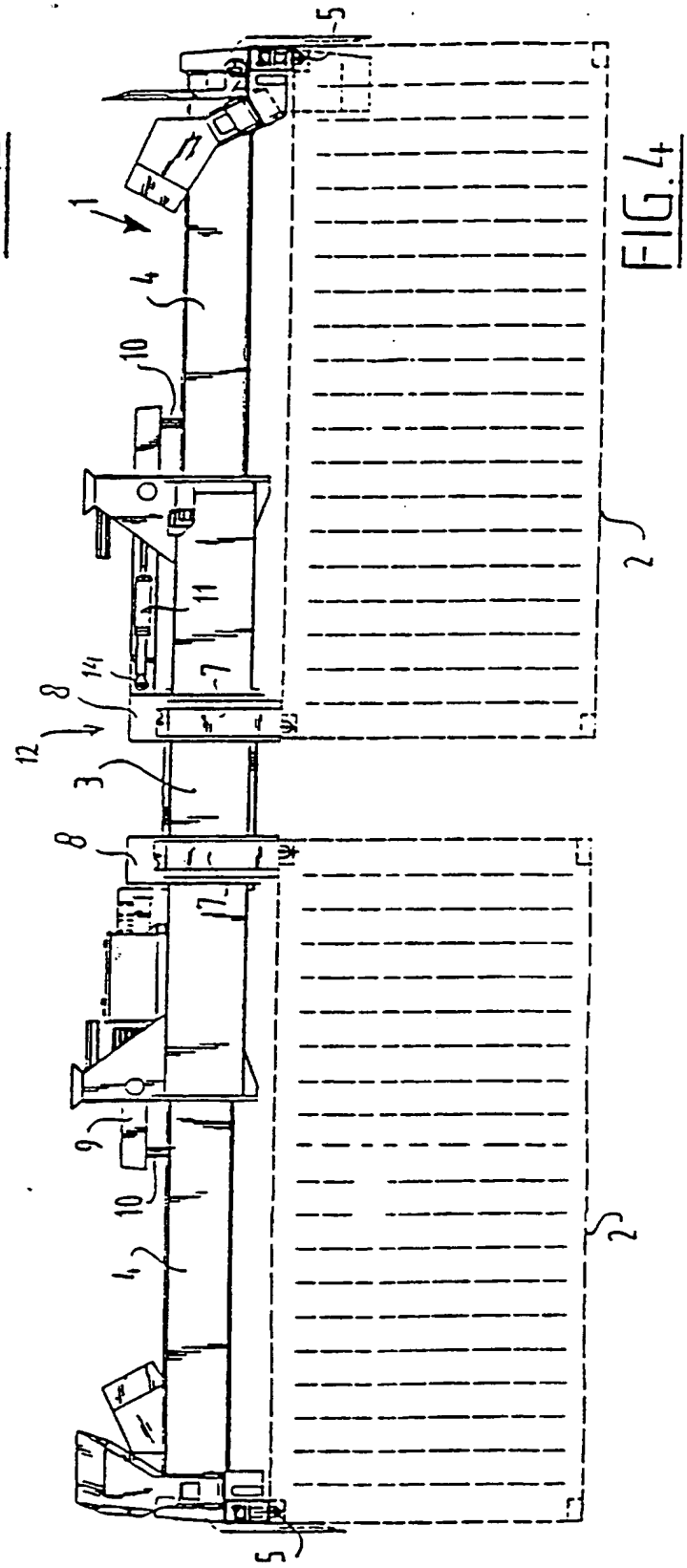

FIG.4

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INTERNATIONAL SEARCH REPORT

International Application No
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A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 B66C1/66

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 B66C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	US 5 280 980 A (COATTA) 25 January 1994 see column 5, line 65 - column 6, line 23	1-3,7 5,8

☐ Further documents are listed in the continuation of box C.

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1

Date of the actual completion of the international search	Date of mailing of the international search report
11 August 1997	22.08.97

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5280980 A	25-01-94	NONE	

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